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FOOD PRICES and CONFLICTS

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ABSTRACT

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Food prices surge during 2007-08 has induced an enormous impact on the whole world, especially on the Sub-Saharan African countries. The factors that caused the food prices surge during 2007-08 have influenced food prices in different levels. The factors can be analyzed by demand and supply model. On the demand side, the factors include biofuel conversion effects, speculative effects, and the food consumption structure changes in China and India. On the supply side, the factors include export restrictions effects and livestock feeding effects. However, none of the factors could be ignored, since there are psychological impacts that can enlarge the effects. Conflicts, especially riots and the armed conflicts, intrastate conflicts, non-state conflicts and one-sided violence have been occurred in many Sub-Saharan African countries during 2007-08.

Hendrix, et al. (2009) stated that “relative deprivation” hypothesis combined economic and psychological factors. The hypothesis focused on the factors that related to people’s basic needs, perceived entitlement and expectations. Relative deprivation based on economic grievances that related to economic growth, inflation and the changes in the international market prices of major trade products, the level of income and the income change. Conflicts might be onset once people could not achieve what they desired or when their “relative deprivation” increased. The case study in this thesis related to 32 low-income Sub-Saharan African countries (excluding oil countries). In order to investigate economic grievances, I separate these 32 countries into importing countries and exporting countries. I focus on the eight riots’ countries – Senegal, Mozambique, Mauritania, Guinea, Ethiopia, Cote d’Ivoire, Burkina Faso and Madagascar.

Findings of this thesis are that in the countries with low speed economic growth and high inflation, low-income people can be easily affected by international food prices shocks. Psychology is a powerful tool, which may enlarge the relative deprivation and the factors that causing international food prices surge during 2007-08. In order to avoid conflict onset in Sub-Saharan African countries, to avoid international food prices shock is necessary, especially for food importing countries that have to be vigilant on the international food market. The food availability and stability are important for a country to remain its peace.
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1 INTRODUCTION

“The masses regard sufficient food as their heaven” – a Chinese archaism, which tells us how important food is. In this paper, I am going to investigate the reasons that cause international food prices increase during 2007-08 and the effects of increased price on Sub-Saharan African countries, furthermore high food prices led conflicts. The relationship between food prices and conflicts is the main topic in my thesis.

The purpose of the thesis is to study the relationship between food prices and conflicts. The reason for choosing Sub-Saharan African countries is that a quarter of people are in hunger in Sub-Saharan Africa (UN News Centre, 15 May 2012), and conflicts in Sub-Saharan Africa have caused more than 4 million battle deaths since 1945 (Bruckner, 2010). Food and Agricultural Organization (FAO, 2008) estimated that rising food prices caused 24 million people to suffer from hunger in Sub-Saharan Africa. The riots and demonstrations have occurred in more than 30 countries during 2007-08. “Jean Ziegler, the United Nations Special Rapporteur on the Right to Food, offered a depressing prognosis: ‘We are heading for a very long period of rioting, conflicts (and) waves of uncontrollable regional instability marked by the despair of the most vulnerable populations.”’ (Hendrix, C., et al. 2009).

In Chapter 2, I analyze movements of the international food market and figure out the import and export effects in low-income Sub-Saharan African countries (excluding oil countries) after international food prices surge. On the demand side, the factors that affect food prices surge include biofuel conversion, speculative behaviour and the food consumption structure changes in China and India. On the supply side, the factors include export restrictions and livestock feeding. I add the psychological effects into the reasons that caused 2007-08 international food prices surge. I present the adjustment effects in the food market and describe the attributes of Sub-Saharan African countries. In Chapter 3, I present the fluctuations of the special demand and supply factors that caused 2007-08 food prices surge.

In Chapter 4, I concentrate on special countries that had riots onset during 2007-08. I collect the data of conflicts onset from 32 low-income Sub-Saharan African countries (excluding oil countries) during 1997 to 2010 from Uppsala conflicts’ database, in order to find out any relationship between
food prices surge and intrastate conflicts, armed conflicts, non-state conflicts and one-sided violence. I analyze the reasons behind conflicts onset.

In Chapter 5, I provide the literature review on the relationship between food prices and conflicts and present the “economic grievance” method. The economic grievance is the linkage between food prices and conflicts, which might be the best approach to explain the conflicts onset caused by food prices surge in 2007-08. Relative deprivation constructed on the economic grievances with psychological effects stimulates the conflicts onset in Sub-Saharan African countries (excluding oil countries). Chapter 6, I conclude the findings.
2 THE FOOD MARKET

2.1 Definitions

Food is defined as “raw food” and “cash crops and feeds”. “Raw food refers to meat, dairy, grains, and fruits and vegetables. Cash crops and feeds refer to tropical foodstuffs, for example, coffee, tea, cocoa, spices, nuts, and feeds and agricultural raw materials such as cotton etc.” (Ng and Aksoy, 2008).

International food prices are tracked by food prices index. “FAO Food prices Index” is “a measure that tracks the monthly change in the world price of a basket of five food commodity groups (cereals, oilseeds, sugar, dairy and meat), weighted with the average export shares of each of the groups for certain time. The index is considered as a global benchmark for food prices trends.” (FAO – Food and Agricultural Organization of the United Nations)

Food is the essential product for human beings. If food prices increase, many people cannot afford to buy food products, their food security is threatened. “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life.” (FAO – Fiat Panis, 2006)

Food availability and stability are two forms to represent food security. “Food availability” may refer to, “The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports.” (FAO – Fiat Panis, 2006) and “Stability” of food may refer to, “To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks e.g. an economic or climatic crisis or cyclical events e.g. seasonal food insecurity. The concept of stability can therefore refer to both the availability and access dimensions of food security.” (FAO – Fiat Panis, 2006)

The international food prices surge during 2007-08 caused international monthly real food prices index increased from 127.3 in May 2007 to 184.9 in June 2008 (2002-2004=100) (FAO - Food and Agriculture Organization of the United Nations). The food prices increasing have caused many poor Sub-Saharan African people couldn’t afford to buy food. Their food security has been threatened.
The international food prices surge during 2007-08 is related to many factors both on demand side and on supply side. First, I present the factors that affect demand and supply side in Chapter 2.2 and 2.3. Second, I describe the adjustments of food market using demand and supply model in Chapter 2.4. Finally in Chapter 2.5, I focus on Sub-Saharan African Countries (excluding oil countries), gather the attributes of these countries and present the effects on the countries from 2007-08 international food prices surge. The factors that caused 2007-08 food prices surge were adopted from World Food Programme (2009).

### 2.2 Factors affecting the demand side

The main demand effects arise from consumption structure changes in China and India, population growth, biofuel conversion, exchange rate, and speculation.

For many developing countries, especially in China and India, increasing incomes led demand of consumers on more healthy food products. Chinese and Indian food consumption structure had changed from the consumption of wheat, rice and other cereal products to the consumption of meat and dairy products. These changes induced less demand of cereal for human beings, but more demand of cereal for livestock feeding. Detail study about the effects of food consumption structure changes will be in Chapter 3.3.

World population has increased from 3 billion in 1959 to 7 billion in 2012 (BBC news 26 October 2011). World population is expected to be 8.9 billion in 2050 (UN, 2004). Rapid population growth followed by increasing food demand, which means that food supply has to be increased by 70 percent between 2005-08 and 2050 (FAO, 2009b). The increased world food demand had been met by the corresponding growing supply, and the prices surge in 2007-08 was caused by short-term shocks. Yet, for the long-run food prices stability, large population might lead to a catastrophe.

Since 2004 the demand of maize had increased, as it was the material for biofuel conversion. Demand shock of maize led to food market supply shortage during 2006-07. The producers expanded the maize production, and even changed the usage of land for planting maize. Consumers changed their consumption to consume substitutes, such as wheat and rice. However, the consumption of wheat and rice had decreased due to Chinese and Indian changing their food consumption structure as shown in Figure 7.
The US dollar depreciated against the Euro by 35 percent from January 2002 to June 2008 (Mueller, 2011), US dollar exchange rate against Euro was dropped from 1.16 in Feb. 2002 to 0.77 in Feb. 2007 and further dropped to the bottom at 0.63 in Jul. 2008 (European Central Bank). Declining US dollar exchange rate improved the price competitiveness of the United States exports in foreign markets and deteriorated the price competitiveness of foreign goods in the United States market. Since most of food commodities were denominated in US dollars and the United States was a major grain exporter, US dollar depreciation decreased food prices for countries whose currencies were appreciating against the dollar, which caused international food demand increase.

Lagi et al. (2012) suggested, food prices changes were not fundamentally caused by exchange rates. The reasons were the price of commodities in Euros increasing at the same time as those in dollars; and in 2009 when the exchange rate again peaked, food prices peaked neither in Euros nor in dollars. However, the demand increased by dollar depreciation can be the additional effect.

Global financial crisis in 2000s induced 317 billion US dollar invested in commodity index funds in July 2008 (Mueller, 2011). The reason was that commodity index funds were more profitable than traditional funds, especially in the grain and meat markets the prices increased almost five-fold from 2007 to 2008 because of the crisis. Demand and supply conditions of food markets cannot be complete reflected after the food market distorted by speculation and the food prices volatility increased (Baffes, J. and Haniotis, T., 2010). However, speculation increased the quantity demanded for food products, as speculators buy cheap and hold stocks for future profits. Speculation created false impression on food demand, followed by food supply increase and inventory increase.

### 2.3 Factors affecting the supply side

The main supply effects arise from stock reduction, livestock feeding, energy prices, exchange rates, weather and export restriction.

World grain reserves have shrunk over the last decade since the new system “just-in-time” delivery for grains. In early 2008 there was only a 60-day supply of wheat, rice, and maize, down from a decade ago which was 3 to 4 months (Mueller 2011). China decelerated its food stock instead of accelerating it. The reasons are that food demand increased in 2000s and food prices had fallen by years. Lower stocks and tighter supply meant the tighter demand-supply balance and less ability to cope with sudden onset factors, such as poor weather effect and high petroleum price effect. As a result, food prices increased dramatically during 2007 to 2008 (Alexandratos, N., 2008)
The demand on cereals for livestock feeding has increased in China and India gradually since 1980. Chinese and Indian income increase induced their food consumption structure changes to consume more meat and dairy products in China and India. China and India domestic cereal production had to supply for their increased demand on livestock feeding, thereby reduced China and India cereal exports during 2002-07. Further examination will be on Chapter 3.3.

The prices of energy on fertilizer production, mechanization, and transportation are directly channelled to the food production. On the other hand, the demand on food increases led the demand on energy increases. As Mitchell estimated that the elevated energy costs were responsible for 10 to 15 percent of the increase in the global food CPI (Mueller, 2011). As Lagi, M et al. (2012) stated three reasons that energy costs cannot account for food prices changes. First, the peak of oil price is followed after peak of wheat price in 2008. Second, the increases in production cost are covered by the increases in sales price. Third, the demand of biofuel conversion recently has increased smoothly that does not track the oil price. However, the increased costs of energy for producers cannot be the main effect on international food prices surge in 2007-2008.

For countries with appreciating exchange rates, declining US dollar would induce countries’ import demanded increase and domestic food supply decrease. Declining US dollar would also add the pressure on domestic food market, causing exports supplied decrease, producers had to raise food prices in order to cover the cost on food production.

The same reason as the exchange rate effects on the demand side, the prices of commodities in Euros increased at the same time as those in dollars and in 2009 the exchange rate again peaked, yet there was not any food prices peak either in Euros or in dollars. However, the supply decreased by dollar depreciation can be the additional effect.

Australian wheat exports were decreased by 45.6 percent in 2006-07 compared to 2005-06, which caused by droughts. The wheat exports were further decreased by 14.29 percent to 2007-08. However, the export rate was increased by 97.57 percent to 2008-09 (Australian government). In Ukraine and European Union, grain productions were also reduced, which induced 10 million tons grain export decrease by poor crops in 2007. However, the grain decrease was offset with the bumper crops in Argentina, Kazakhstan, Russia and the United States. Although it was decreased by 1.3 percent in 2006, the global grain production increased by 4.7 percent in 2007. Such weather effects could not be the major contributor to the food prices increases (Mitchell, D. 2008).

In the mid-2008, there were about 40 countries had banned their agricultural export, including major exporters such as Argentina, India, Kazakhstan, Pakistan, Ukraine, Russia, Vietnam (World
The purpose of the restrictions was to protect their domestic food supplies and in response increased commodity price. The export restrictions magnified the price movements in international food market and decreased the world food supply, furthermore drove international food prices rising up.

2.4 Adjustment in the food market

In 2007-08, food prices have increased notably in the world market. The market effects of the forces discussed above in Chapter 2.2 and Chapter 2.3 are presented in Figure 1.

In Figure 1, it is assumed that the demand shocks were quite substantial. The reason is that considerable increase in speculative demand of food products, as biofuel conversion and food consumption structure changes in rapidly developing countries and so on. As a result, the demand curve moves right wards from D to D’, which makes market price and quantities rise along the market supply curve. At the same time, there may happen a negative supply shock due to export restrictions, use of grain as livestock feeding etc. As a result, the supply curve moves from S to S’ making price rise and quantities fall along the market demand curve. At the new market equilibrium, market price has increased from $P_1$ to $P_3$ and market quantity has increased from $Q_1$ to $Q_3$.

Food prices tend to be volatile and more elastic, as well as the supply and demand changed more price-elastic, due to speculators buy commodity stocks at low price and sell them at high price. However, food products are inelastic products, as people have to have food and crops have already
been planted. The inelastic price induces steep demand and supply curves, inferring a small shift in any one of the curves will lead to a large change in the equilibrium price and a small change in the equilibrium quantity (Begg et al, 1987).

2.5 The effects on Sub-Saharan African countries markets

The attributes of Sub-Saharan African countries are low-income, small net import dependent and vulnerable countries. The countries with such attributes are more sensitive of international food prices shocks.

Low-income country is defined as gross national income (GNI) per capita equal or less than US dollar 995 (Africa Development Indicators, 2011). There are 32 low-income countries (excluding oil countries) among Sub-Saharan African countries. There is 69.2 percent ratio of poverty headcount purchasing power parity (PPP) at $2 a day in Sub-Saharan Africa (World Bank, Data). Senegal, Mozambique, Mauritania, Guinea, Ethiopia, and Cote d’Ivoire, Burkina Faso, Madagascar are low-income countries, gross national income (GNI) per capita in 2008 are 980, 380, 980, 340, 280 and 980, 480, 410 in 2011 US dollar (Africa Development Indicators, 2011).

The population in low-income Sub-Saharan African countries (excluding oil countries) was 538.7 million in 2009, as shown in Appendix A. Most of low-income Sub-Saharan African countries (excluding oil countries) are small traders of international food products. For low-income Sub-Saharan African countries (excluding oil countries) as a group, raw food exports were 1.2 billion dollar in 2004/2005, which equivalent to the exports of Colombia or Greece; and the imports were 2.5 billion dollar, which equivalent to the imports of Portugal or Greece (Ng, F. and Aksoy, M., 2008).

Compare to world exports 203.6 billion dollar and imports 199 billion dollar, low-income Sub-Saharan African countries (excluding oil countries) as a group, raw food exports only occupied 0.5 percent international food export market and raw food imports occupied 1.3 percent of food import market (Ng, F. and Aksoy, M., 2008). This is the reason why domestic food prices of low-income Sub-Saharan African countries (excluding oil countries) is directly related to international food prices changes, and their demand for food mostly determined by food prices.

The low-income Sub-Saharan African countries as a group were a net food importer. Its trade was in deficit in raw foods of the overall trade balances for low-income Sub-Saharan African countries as a group. There were 6 raw food exporting countries – Cote d’Ivoire, Kenya, Somalia,
Madagascar, Zambia and Burkina Faso and 26 raw food importing countries in low-income Sub-Saharan Africa (excluding oil countries) – Senegal, Benin, Mozambique, Ghana, Mauritania, Ethiopia, Guinea, Tanzania, Uganda, Guinea-Bissau etc., as shown in Appendix A.

The potentially vulnerable countries were defined by Ng, F. and Aksoy, M., 2008) as net food or agricultural imports of more than 5 or 10 percent of county’s total imports. Excluding conflicts countries Somalia, among the above importing countries, Senegal, Benin, Mozambique, Mauritania and Guinea-Bissau were the countries with net imports as percentage of all imports over 5 percent of total imports. There were three vulnerable low-income countries in Sub-Saharan Africa (excluding oil exporters), whose net narrow food trade deficit was more than 10 percent of their imports – Benin, Guinea-Bissau and Senegal (Ng, F. and Aksoy, M., 2008). The 5 percent cut-off means that 1 percent country’s imports will be impacted by 20 percent increase of food prices. The 10 percent cut-off means that 2 percent country’s imports will be impacted by 20 percent increase of food prices. Suppose the food prices increased by 130 percent, which means 6.5 percent of country’s imports were impacted for the 5 percent cut-off country and 13 percent of country’s imports were impacted for the 10 percent cut-off country. The effects on country’s import by 6.5 percent or 13 percent were not very unacceptable.

However, the low-income Sub-Saharan African countries (excluding oil countries) as a group were a net exporter of agricultural commodities, as there are 22 net exporters and 11 net importers. The low-income Sub-Saharan African countries as a group could export other agricultural products and import primarily grains, such as Cote d’Ivoire in 2008 exported cocoa, coffee, palm oil, pineapples, bananas etc. and imported basic food stuffs (U.S. Department of State, February 17, 2012).

International market is a competitive market, as there are many buyers and sellers and none of them can influence the price individually at which the product is sold. If market in the economy is a perfect competitive equilibrium, the market is Pareto-efficient, which means nobody can be made better off without making someone else worse off. Sub-Saharan African people are the victims of food prices surge during 2007-08.

2.6 Gains and losses from international trade

Producers set marginal cost equal to price and consumers set marginal benefit equal to price. Price plays a remarkable role in the international market, as it ensures that the initial and final position of competitive equilibrium. The final market equilibrium means that marginal benefit of consumers
equals to marginal cost of producing products. The adjustment occurred between price and quantity by demand and supply model between the initial and final equilibriums.

Figure 2 presents Sub-Saharan African countries as a group (excluding oil countries), which is small relative to the world market and must take the world price as given, with its domestic demand and supply of a certain food product in a competitive market.

The free-trade equilibrium at point E with quantity $Q_E$ and price $P_E$, the equilibrium is determined by the world price. Suppose the world price is $P_1$, domestic production is only $P_1C$, which does not satisfy the quantity demanded $P_1F$. Thus, the shortage $CF$ is imported from abroad. Consumer surplus is the area $MFP_1$ and producer surplus is “$d$”. The net gain of Sub-Saharan African countries as a group (excluding oil countries) is the area “$a+b$”. Suppose international food prices increased from $P_1$ to $P'_1$, consumer surplus shrank to the area $MBP'_1$ by loss the area “$e+b$” and producer surplus expanded to “$d+e$”. The net gain of Sub-Saharan African countries as a group (excluding oil countries) is the area “$a$”. Area “$b$” is the net loss of Sub-Saharan African countries as a group (excluding oil countries) during international food prices surge. Domestic production is only $P'_1A$, which does not satisfy the quantity demanded $P'_1B$. Thus, the shortage $AB$ is imported from abroad. The imported quantity $AB$ decreased from the former imported quantity $CF$.

On the other hand, suppose the world price is $P_2$, domestic production is $P_2L$, which over the quantity demanded $P_2J$. Thus, the exceed supply $JL$ is exported to abroad. Consumer surplus is the
area “i+j” and producer surplus is the area NLP2. The area “h” measures the gains of Sub-Saharan African countries as a group (excluding oil countries). Suppose international food prices increased from P2 to P’2, domestic consumption decrease and domestic production increases as excess supply GH is exported abroad. The exported quantity is increased from the former exported quantity JL. Producers gains from increased export price by area “i+k”, yet consumer loss by the area “i”. The area “k” is the net gain of Sub-Saharan African countries as a group (excluding oil countries), resulting from the increase of producers’ surplus minus the decrease of consumers’ surplus.

By construction of Figure 2, it is easy to see that the welfare effects are quite different, if the Sub-Saharan countries are initially exporters. Then a similar international food prices shock works in the benefit of the Sub-Saharan end, because net welfare effects are clearly positive. Yet, consumers’ surplus is diminished while producers’ profits rise so that they more than outweigh the consumers’ loss.
3 FLUCTUATIONS IN FOOD PRICES

Economic fluctuations occurred due to demand shocks or supply shocks that were presented as the shifts of short-run demand curve or short-run supply curve. Fluctuations in the real food prices led export and import more volatile. The consumers or producers or nations could gain or loss during the fluctuations.

3.1 Biofuel conversion effects

Biofuel conversion, a new technology that developed fast in 2000s, concerns to conversing maize into biofuel. Biofuel could be used as energy to substitute for petroleum products. The purpose of ethanol conversion is to meet the energy needs and to replace high-priced petroleum products; to reduce greenhouse gas emissions for environmental improvement; and to provide stable energy supply reducing dependence on oil producing countries. As a substitute to gasoline, biofuel price would equal to two-thirds or more of gasoline price depending on the cost of the resources. The demand of biofuel increase leads the maize price to increase (Babcock, B., 2011).

Figure 3: Ethanol Production during 1980-2010

Source: Mueller, S., et al. (2011)
As Figure 3 presents, world biofuel production had increased dramatically since 2000 to 2010. It was increased from 4 billion gallons in 2000 to 20 billion gallons in 2009. The United States started to develop biofuel products from 1980s and Brazil from 1990. European Union started only from 2000. Since more countries started to produce biofuel products in 2000s, the demand of cereal has increased.

The United States, Brazil and China are the major biofuel producers. Among them, the United States is the largest bio-ethanol producer. Annual production of bio-ethanol in US was 18.5 billion litres in 2006 (Naylor, R., et al. 2007). In the United States, biofuel products were mostly converted from maize. The United States was one of the biggest maize producers who supplying about 40 percent of the world’s total maize production in 2008. Among these, there were 55 to 60 percent maize products for export (Agricultural Commodities, 2003). About a third of US maize production was used to produce biofuel in 2008/2009 (WFP, 2009). The United States maize consumption for biofuel conversion had increased by 160 percent from 2003/2004 to 2007/2008 as shown in Figure 4.

Figure 4: World Cereals Production and Consumption (million tons)

Source: Alexandratos, Nikos (2008)

In Figure 4, the blue line presents world cereals production fluctuation during 2000-08. The big wave during 2004 to 2007 was caused by maize biofuel demand in the United States. The orange area presents the quantities of the United States maize biofuel consumption that had gradually
increased since 2003. However compare to the rest-of-the-world market for cereals consumption, maize biofuel consumption in the United States occupied a small ratio.

**Figure 5: The Growth Rates of World Cereals Consumption**

Source: Alexandratos, Nikos (2008)

Figure 5 presents the growth rate of coarse grains consumption was doubled during 2002-08 from 1995-2001, due to maize used for biofuel conversion. The growth rate was much less if excluding to count maize used for biofuel conversion. For both wheat and rice, the growth rate declined during 2002-08 compared to 1995-2001. The growth rate of rice consumption was 2 times lower during 2002-08 than during 1995-2001. World cereals consumption growth rate increased by 0.4 percent per annum during 2002-08 from the growth rate during 1995-2001. However, the growth rate of world cereals consumption would not increase during 2002-08 without counting biofuel demand. The available analyses suggest that there were from 3 to 30 percent reason of biofuel production causing international food prices increase during 2008 (Mueller 2011).

### 3.2 The speculators and ethanol model

As mentioned at the beginning of this paper, price played a remarkable role in international food market. The purpose of speculators is to maximize their profits. Speculators set their target price based on supply and demand analysis. If the rational expectation about future price rises, speculator would buy more. Speculators’ investment in the commodity stock created market demand followed by supply increasing, which impacted on the actual supply and demand. The market would depart
from its equilibrium leading to rapid increase in price. Furthermore if future price expected to rise, price would be adjusted at the current time to sell less food product that caused inventory increase, which meant inventory would store more food products for future consuming.

Lagi, M., et al. (2012) suggested an oscillatory behaviour by adding the speculator trading to a dynamic model of supply and demand equilibrium. The speculators could cause the commodity price to depart from the market equilibrium if the speculators were too powerful. Lagi, et al. mentioned that current world market was at the point that speculation can strongly affect the equilibrium of market supply and demand. They combined the effects of speculators and ethanol conversion into a single model, as shown in Figure 6.

Figure 6: Speculators and ethanol index with food prices index during 2004-2011


Figure 6 presents the fluctuation in food prices consistent with the fluctuation of the speculators-ethanol unified model. The blue solid line presents the FAO food prices index. The food prices index had increased since 2007 and peaked at 2008 by more than 60 percent and dramatic decreased to former level in 2009. Red dotted line is consistent with the FAO food prices index changes, which presented the speculators and ethanol conversion unified model and had also increased since 2007 and peaked at 2008 and decreased to former level in 2009. Food prices index again rebounded in 2010 by more than 65 percent increase until 2011 and it reached to 230 points in 2011. The blue dashed line shows the price changes due to maize ethanol production, which gradually rose up since 2004 by more than 75 percent to 2011.
Biofuel conversion itself could not describe 2007-08 food prices surge. Biofuel conversion and US dollar depreciation induced speculators investment moving to the food market. Further reason could be the global financial crisis during 2000s. The United States subprime mortgage crisis induced its housing bubble, which peaked in 2005-06 and burst in 2006-07. Furthermore, induced the panic of private and public food shortage and implicated 2007-08 food prices surge.

Speculators moved their investments from unprofitable equities and mortgage bonds to the profitable market. They estimated their target price based on supply and demand and used it to decide whether to buy or sell. Biofuel conversion caused supply shock, which induced speculator investment and led to large demand shock. The demand shock could induce the changes in expectations and move the demand curve. Demand shock had only short-run effects on international food market, in the long-run market will self-correcting.

The fluctuations in 2007-08, food prices increased took approximately 12 months until the prices peaked. After another 12 month from Sept. 2008 speculative bubble, world grain inventories increased rapidly, until Sept. 2009 the increase speed turned to slow. The quantity of inventories increased 140 million metric tons from Sept. 2007 to Sept 2010 (Lagi, 2012). The increased inventories caused by the increase of Speculative demand, which could not directly compensate to the supply for human beings, as the increased demand was not the real demand.

Lagi, M., et al. (2012) investigated the fluctuations in food prices during 2007-2008 are mainly caused by the shocks due to speculators behaviour and biofuel conversion. Mueller (2011) stated that the speculative bubble during 2007-08 was a significant factor to cause international commodity food prices increase. However, Timmer (2010) stated that financial speculation had played a small role on 2007-08 prices surge, the psychology of hoarding behaviour was more contributed to 2007-08 food prices surge. I suggest to combine these three inferences, as speculative behaviour and biofuel conversion induced more people to focus on food prices so that induced the psychology of hoarding behaviour, furthermore leading food prices surge in 2007-08.

3.3 The effects of food consumption structure changes in China and India

China and India comprise more than one-third of the world population (World Bank, 2010), which has a large impact on the global consumption pattern. One-third world population can influence the rest of the world to a certain extent. In China and India, households turned to demand more meat and dairy products. A considerable number of livestock is needed and a considerable amount of
cereal is needed for livestock feeding. Domestic meat prices increased, which threaten local food stability and food security. Furthermore, it affects the rest of world food market.

Increased demand of cereal for livestock feeding had been supplemented by Chinese and Indian domestic supply. The increased cereal demand in China and India didn’t affect international food market directly. However, the cereal supply from China and India to the international food market had been cut, as Chinese and Indian export supply moved to their domestic demand on livestock feeding.

Figure 7: Growth rate of Cereal consumption in China and India

![Graph showing growth rates of cereal consumption in China and India](image)

Source: Alexandratos, Nikos (2008)

Cereal demand in China and India decreased rarely for human beings, yet increased for livestock feeding. This switch attracted me to examine the cereal demand was finally decreased or increased, as it has caused the whole world to worry the food prices changes. Demand for meat products in China had been increased by 45 percent since 1997 to 2007 as the blue line shown in Figure 8; during the same period, demand for meat products in India had been increased by 120 percent as the blue line shown in Figure 9. Yet meat total consumption in India kept low, which was 4 kg per caput in 2007 (Agricultural Commodities, 2003). The changes of meat consumption in China and India was noticeable, however world meat production increased from 44 million tons in 1950 to 265 million tons in 2005 (Brown, 2006). The rapid increase of the demand on meat production stimulated the meat supply and demand on cereals for livestock feeding.
As shown in Figure 7, the growth rate of the consumption of coarse grains increased during 2002 to 2008 by 0.8 percentages per annum from 1995-2001 to 2002-2008. Yet, during the same period, as consumer welfare changes, wheat and rice consumption had declined. Cereal total consumption had declined by 0.2 percentages per annum from 1995-2001 to 2002-2008 in China and India.

Figure 8: Growth of China Meat Consumption and Cereals for livestock feeding using

![Graph showing growth of China Meat Consumption and Cereals for livestock feeding](source: Alexandratos, Nikos (2008))

Figure 9: Growth of India Meat Consumption and Cereals for livestock feeding using

![Graph showing growth of India Meat Consumption and Cereals for livestock feeding](source: Alexandratos, Nikos (2008))

Source: Alexandratos, Nikos (2008)
Increasing domestic demand for livestock feeding in 2000s cut China and India cereal exports and thus world cereal supply decreased. Cereal used as livestock feeding was increased smoothly from 1980 to 2007 by 240 percent in China as the black line shown in Figure 8 and by 260 percent in India as the black line shown in Figure 9. Therefore, the demand of cereal feeding increase led total

Figure 10: China and India Cereals Total Supply and Net Trade

![Graph showing China and India Cereals Total Supply and Net Trade]

Source: Alexandratos, Nikos (2008)

Figure 11: Net Cereal Trade (thousand tons) in China and India

![Graph showing Net Cereal Trade (thousand tons) in China and India]

Source: Alexandratos, Nikos (2008)
cereal consumption in China and India increasing. As Figure 8 and Figure 9 shown, during 2002 to 2007 the total amount of cereal feeding increased in China and India was approximately to 8.8 million tons. Among it, China cereal feeding increased by 7.5 million tons and India by 1.3 million tons.

China and India cereal supply had been remained stable during 2000 to 2007 as shown in Figure 10. Yet cereal domestic supply mostly met their domestic demand during 2002 to 2007. As figure 11 shows, China and India net cereal trade had decreased by 78 percent from 27 million tons to 6 million tons during 2002 to 2008. China and India cereal supply decreased by 21 million tons during 2002 to 2008. Although the reduction of the net trade was not a large amount, however plus the increase of maize demand for biofuel conversion, it alerts Asian and Western world that the cereal demand was increasing and becomes one of the psychological reasons causing international food prices surge in 2007-08.

### 3.4 Psychological effects

Speculator behaviour was controlled by profit purpose. At certain extent, speculator behaviour was influenced by psychological factors, as most of speculators following others to buy or sell their stock shares. From this point of view, all the factors from both demand and supply sides had influenced on people’s thoughts in varying degrees, such as increased cereal demand for biofuel conversion and livestock feeding, weather effects, US dollar depreciation and energy effects. All these factors influenced speculators’ thoughts, that the commodity food market was profitable.

Timmer (2010) studied rice market and explained the reasons why international rice price increased during 2007-08. The psychology of hoarding behaviour on private and public sectors had main contribution on the price increase. Timmer (2010) told a very convincing story about one billion household hoarding their one-week consuming rice in their pantry, the quantity of rice might be 7 million tones to about a quarter of the global annual rice trade. If added farmers, traders, rice millers and even governments into account, the amount of hoarding rice would be considerable. Food crisis was the risk of world instability.

Global food panic was also determined by psychological factors. Psychology might create unimaginable possibilities, food prices panic induced exporting countries to sharpen their exporting restrictions in short time and importing countries quickly action in order to increase domestic stockpiles. India banned rice exports on October 9, 2007, which caused 0.7 million tons rice
reduced in the month after the ban. The ban on exports caused food prices to rise in following weeks (Mitchell, D. 2008). Indian export ban had significant negative effects on neighbouring and other importing countries, as Figure 12 shows that Vietnam and Philippines also banned their rice exports at the beginning of 2008. All these bans induced the international food supply decrease. The action of rice export restriction in India has caused India large amount of food rot in its stock.

Figure 12: Thai 100 percent B Price & Export Restrictions


Until May 2008, Japan announced that it would re-export all of its imported rice stocks of over 1.5 million tons, which eliminated the panic of Asian rice exporters. The rice price started to fall. (Mueller, 2011) The rice market has multiple layers, each layers have their own speculations. Psychological effects through speculations not only affected governments, but also affected households, farmers, traders and rice millers. Who were the households, farmers, traders and rice millers? Seven billions people in the world!
CONFLICTS

Conflict means, “fighting”, fighting by mouth, body, gun, plane or atomic bomb etc. The result of conflict might be the fighting person even innocent to have mental stimulation, physical trauma, loss of loved ones, or ultimate death. As Bartos, O. (2002) defined conflict as, “A situation in which actors use conflict behaviour against each other to attain incompatible goals and/or express their hostility.” More definitions of Conflicts are in Appendix B.

Conflicts are mostly between two parties, the conflict is “State conflict” if at least one of the parties is the government of a state, such as intrastate conflict. Otherwise the conflict is “non-state conflict”. One-sided violence is the conflict between the government of a state or by a formally organized group against civilians. The definitions of riots and anti-government demonstrations mainly refer to the first use of armed force in a state-based conflict, which is the conflict between the government and a rebel group. (UCDP – Uppsala Conflict Data Program)

Uppsala Conflict Data Program has defined the level of conflict according to the number of deaths. “Minor conflict is at least 25 but less than 1000 battle-related deaths in one calendar year. War is at least 1000 battle-related deaths in one calendar year.” Both state conflict and non-state conflict are consistent with this definition. One-sided violence is also defined as “at least 25 deliberate killing of civilians in a year”. Riots and anti-government demonstrations are unnecessary to have deaths.

4.1 Food riots in importing countries

Guinea, Mauritania, Senegal, Mozambique and Ethiopia were raw food importing countries in years 2004/2005. Their net imports of raw food were -46, -63, -281, -178 and -61 million US dollars. All these countries had been reported to have food riots onset during 2007-08 (UN New Centre, 11 April 2008).

In January and February 2007 in Guinea, the anti-government demonstrations caused nearly 200 deaths. The reason was that the over worsening living conditions. The demonstrations occurred sporadically throughout 2007 and in mid-February 2008, rioting broke out in Ratoma caused by high food prices (Harsch 2008).
In November 2007 in Mauritania, ‘bread riots’ lasted for ten days. Hungry people looted food stores and attacked police stations in Nouakchott. There were at least nine other towns exploded in protests. At least one demonstrator was killed during the protests (Harsch 2008) (Bush, R. 2010).

In late 2007 in Senegal, unions and civil society groups were active in the demonstrations. On the 30th of March 2008 in Dakar, two consumers’ associations called a march with the slogans “We are hungry” and “Life has become difficult” to against rising price. In April 2008, more protests were onset by some of the country’s trade unions (Harsch 2008), which caused by curb informal street hawking and led to enormous street protest, over a thousand people demonstrated in Dakar for high living cost (Bush, R. 2010).

At the beginning of February 2008 in Mozambique, the capital Maputo had a protest, which was due to over hikes in bus fares and bread price. The protest caused six people dead and more than 100 injured (Harsch 2008).

4.2 Food riots in exporting countries

Cote d’Ivoire, Burkina Faso and Madagascar were raw food exporting countries in Sub-Saharan Africa. Cote d’Ivoire raw food exports were 412 million US dollars in 2004/2005. Burkina Faso raw food exports were 19 million US dollars and Madagascar raw food exports were 63 million US dollars in 2004/2005.

On the last day of March, about 1,500 food rioters marched in the Cocody and Yopougon districts of Abidjan, the largest city in Cote d’Ivoire, chanting “We are hungry” and “Life is too expensive, you are killing us.” (Harsch 2008). After the second day of violent protests, president Gbagbo had to cut taxes on basic household products. One person was killed and at least 10 others injured during riots. Anti-riot police fired in the air and used tear gas in order to disperse female demonstrators (BBC, 2 April 2008).

Burkina Faso three cities Bobo-Dioulasso, Ouahigouya and Banfora had food riots during 20-21 February 2008. The reasons were high food prices and government collects taxes from small-scale merchants (Harsch 2008). There were 100 rioters arrested after they threw stones to a government delegation. President Blaise Compaore stated, “the government having ‘dismantled’ fraud techniques used by traders to avoid paying import and export taxes was the cause of the violence.” (IRIN news, 22 February 2008).
In April 2008, food riots also took place in Madagascar. (UN New Centre, 11 April 2008). In May 2008 in Madagascar, government banned rice exports in order to keep home market supplied. (IRIN, 14 May 2008)

4.3 Other conflicts during 1997-2010

From Uppsala conflict data program database, I collected data of armed conflict about the onset conflicts of intrastate conflicts, armed conflicts, non-state conflicts and one-sided violences from 32 low-income Sub-Saharan African countries (excluding oil countries), as listed in Appendix A during 1997 to 2010.

Figure 13: Conflicts in low-income Sub-Saharan African countries (excluding oil countries) during 1997-2010

![Graph showing conflicts](image)

Source: Data collected from UCDP – Uppsala Conflict Data Program

As shown in Figure 13, intrastate conflicts are consistent with armed conflicts, as intrastate conflict has grown its intensity and most armed conflicts refer to intrastate conflicts. Intrastate conflicts rose by 80 percent from 2005 to its peaked in 2008, then gradually dropped in 2009. For non-state conflict, it sharply rose from 2007 to 2008 by 143 percent, and then sharply dropped to 2007 level in 2009. From these four types of conflict, only one-sided violence was not much related to 2007-08 food prices crisis. It rose from 2006 to 2007 and dropped from 2007 to 2010.
4.4 The reasons behind conflicts

Blattman, C. and Miguel, E. (2010) addressed to some recent arguments. The first argument is that in order to understand the causal of conflicts onset, we have to understand the underlying relationships between economic, psychological and sociological factors are complex. For conflict, the economic motivations are better theorized than psychological or sociological factors. Yet we cannot discard non-economic reasons for conflict. Østby, G. et al. (2009) state that conflicts have long been associated with socioeconomic. They suggest that the multidimensional study on inequality for conflicts. The inequality could be measured by economic, social or political methods.

Social reasons cause conflicts onsets, for example,

1. Conflicts of identity, such as religious, racial or ethnic differences;
2. Conflicts for resource, such as to competing the control natural resources or the distribution the wealth of resources.
3. Decision maker of public affairs implements unequal distribution of power of access to the decision-making process. (Grandvoinnet and Schneider, 1998)

In this paper, we focus on the second item, which relates to fight for food as a resource, since food is the essential product. When people are hungry, they would find a way to fight instead of waiting for dying.

The second argument is about the grievances of food related violent conflicts need to be understood in economic point of view. The economic inequality is one of the factors to cause “grievance”. The fairness and grievance are two important notions in individual decision-making, as individuals have the taste for punishing unfair behaviour and are willing to spend a little private cost for it. The individual willingness to punish unfair behaviour is consistent with preferences for equity with neural-physiological underpinnings (Blattman and Miguel, 2010).

The third argument about preferences might be favour to the person who is in the armed group (Blattman and Miguel, 2010). Østby, G. et al. (2009) studied 22 Sub-Saharan African countries, they found that inequality and conflicts are positive correlated inside limited areas, such as intra-region. They also found that inequality could be based on groups, such as various ethnicity and religion groups, urban-rural groups, genders, or sub-national regions. Horizontal or intergroup inequalities do matter for civil conflicts. “Horizontal inequality” refers to inequality that coincides with identity-based cleavages (Østby, G. et al., 2009). Østby, G. et al. (2009) also argued that
conflicts often take place in limited areas and within groups. Food riots in Sub-Saharan Africa presents the rebel people’s grievance against food distribution inequality, which related to the rebel people couldn’t afford high food prices, high living costs or government decision against their benefits. The rebel people were willing to punish unfair behaviour. They wanted to join the conflict groups in order to get more power, so that they can achieve their own preferences.

Absolute poverty mostly was in rural area in Sub-Saharan Africa, rural population occupied high ratio in Sub-Saharan African countries, as shown in Appendix A. Rural people are most producers. Food prices increased would benefit food producers. However, when food prices increase, government wants to limit the producer’s profit by imposing more tax. Rural producers might fight on government targets, or against extra competing sources. On the other hand, food prices decrease would hurt producers. (Hendrix, C., et al. 2009)

Urban residents react faster than rural farmers when food prices shock onset. Urban consumers might fight on government intervention, or against vendors or “middlemen”. Urban people are food consumers. Food prices increased would hurt urban consumers. On the other hand, food prices decrease would benefit urban consumers. Either rural or urban people were hurt, it would increase the grievances and led to conflicts onset. (Hendrix, C., et al. 2009)
5 THE RELATIONSHIP BETWEEN FOOD PRICES AND CONFLICTS

5.1 Stylized facts

Since long time with low food prices, and demand increase during 2000s’ followed by supply shortage created pressures on low-income countries. International food prices shocks could be easily and quickly transmitted to the Sub-Saharan African countries market by the risks. As Figure 14 shown, international food prices surge triggered protest and riots incidence in 48 countries during 2007-08. Cereal price index rose from 150 points in July 2007 to 270 points in June 2008, which followed by the number of incidence of protests and riots rose from one case in January 2008 rose to 20 cases in June 2008. The number of incidence of protest and riots dropped back to one case in August 2008, as cereal price index declined during the end of 2008.

Figure 14: Food prices and riots in 48 countries during 2007-2008


As Ng, F. and Aksoy, M. (2008) investigated that there were 31 net food importing counties and 8 net food exporting countries out of 39 low-income Sub-Saharan African countries. If excluding 7
oil-exporting countries, there are 32 low-income Sub-Saharan African countries, which including 26 net food-importing countries and 6 net food-exporting countries. International food prices increase not only induced net importing countries at risk, but also induced net exporting countries at risk. The producers in net exporting countries are also consumers, increased producers’ profit could transfer to their higher living cost (Hendrix, C., et al. 2009).

5.2 Survey of empirical literature

In the study on 120 countries over 1970-2007 period, Arezki and Bruckner (2011) found that international food prices shock had significant effects on the incidence of riots, anti-government demonstrations and intrastate conflicts in low-income Sub-Saharan African countries, which was on average increase a one standard deviation in food prices index inducing increase 0.01 standard deviation of the number of anti-government demonstrations and riots. Yet, there was no significant effect in middle- and high-income countries.

By Arezki and Bruckner (2011), exclusive effects that food prices had on “Civil conflict risk” are “the assumption for the majority of the low-income countries were price takers on the international food market” and “the assumption of international food prices being exogenous” that are reasonable after the potentially large food producing countries were excluded from the low-income countries. Ng, F. and Aksoy, M. (2008), “Who Are the Net Food Importing Countries?” mentioned also when study low-income Sub-Saharan African countries had to exclude oil producers and conflict countries, because these special countries could not reflect the whole low-income countries by their special case and they occupied considerable ratio of import and export quantity in low-income countries.

For net food exporting countries, food prices rise led GDP per capita increase, income inequality increase, private consumption decrease, private investment increase and real per capita government expenditures increase. Food prices increase induced the risk of expropriation, as measured by the Political Risk Service Expropriation score. The change in the Political Risk Service Expropriation score was 32.997 with 99 percent confidence, that the higher value score denoted a higher risk of expropriation.

Food prices increase also induced a negative and highly significant effect on the Polity 2 score (Polity2) and deterioration of political institutions in low-income countries. The Polity 2 score was the measurement of the degree of democracy or autocracy. The measurement data was from the Polity IV database. The Polity2 score ranged from -10 to +10, the higher values indicating more
democratic institutions. Arezki and Bruckner found that in the international food prices index a one standard deviation increase significantly reduced low-income countries’ polity2 score by about 0.03 standard deviations on average. The Polity2 scores of low-income countries were average low, which indicated high incidence of civil conflict. The Polity2 scores of middle- and high-income countries were average higher, which indicated lower incidence of civil conflict.

Besley and Persson (2008) found that increasing international commodity import price, as well as export price was strong positively significantly correlated to within-country incidence of civil war. Besley and Persson developed a simple two-sector trade model based on a small open competitive economy with short-run effects, which found the reasons to cause the grievance of consumers and producers. They found that for importing sectors, increasing the imported inputs, for example raw material could induce wage decreasing, as well as to induce the demand for labour decreasing, further more inducing consumers’ grievance; for exporting sectors, increasing the price of exported commodities could raise the probability to civil war incidence, as the rents of natural resource increased, for example the rent of land for producing food products, further more inducing producers’ grievance.

Besley and Persson (2008) provide a cross-sectional study on between-country variation of civil war incidence in 124 countries during 1960-2000. They disaggregated the 124 countries into two groups. One group was the 39 countries that had a civil conflict and another group had not any civil conflict over the same period. They found out that the overall incidence of conflict was 8 percent during the same period. However, it was 27 percent among the 39 countries that had conflicts over the same period. The results presented high-income countries were not significant correlated to conflict than low-income countries; large primary exporters were less likely to correlate to civil conflict. They also found that international commodity price affected conflict incidence if political institutions were weak, otherwise had not effects on conflicts incidence if political institutions were strong. For non-oil primary countries, the price of exports and imports are positively correlated to civil war of the non-parliamentary democracies, but negatively correlated with the parliamentary democracies; for oil export countries, price did not relate to civil war.

Carter and Bates (2011) stated that the impacts of price shocks and government policy choices have to be studied together. They found that when there is civil unrest, government shift its policies in order to favour urban consumers. After government policies favour urban consumers, the relationship between civil conflicts and food prices shocks disappeared. The measurement tool, the Relative Rate of Assistance, was used to measure government policy, the degree that government favours urban consumers or rural producers, which was calculated by the World Bank.
“The Relative Rate of Assistance was a function of the relative extent to which the government separates domestic from international price for agricultural and non-agricultural commodities”. When the Relative Rate of Assistance was positive, which indicated that government policies favour rural producers; when it was negative, which indicated that government policies favour urban consumers.

When international food prices surge, government would change its policy to stimulate local production in order to favour rural producers to produce more food products for domestic market. At the same time, government would ban export restrictions or impose more export taxes to control domestic producers gain too much from foreign markets. They also found out, when international food prices decrease, export price fall, the likelihood of civil wars increases.

Bruckner and Ciccone (2010) found that export price drop will increase the probability of a civil war onset; GDP decrease will increase the risk of civil war onset; Per capita GDP growth of Sub-Saharan African countries are significant positive correlated to GDP growth of their main OECD export destinations. Higher OECD growth would lower the likelihood of conflict onset. They also examined that government expenditures or foreign aid did not significant relate to civil conflicts during international commodity price shocks.

OECD has 34 member countries, including many advanced countries and emerging countries like Mexico, Chile and Turkey. The main destinations of exporting OECD country for Cote d’Ivoire were Germany, France, Netherlands and the United States. Cote d’Ivoire total exports in 2008 was 10.9 billion US dollar F.O.B., including petroleum, cocoa, coffee, timber, cotton, palm oil, pineapples, bananas, fish. (U.S. Department of State, February 17, 2012)

Hendrix, C., et al. (2009) studied 55 cities in 49 Asian and African countries during 1961-2006. They found that international food prices changes were significant negatively correlated to the incidence of protest and riots. However, when price decrease led greater incidence of protest than price increase. The types of regime determined the level of the incidence of protest, hybrid regimes had more protest than democracies, and democracies had more protest than the most oppressive autocracies. Hendrix, C., et al. (2009) also found that GDP growth has strongly and negatively associated with the incidence of riots and protests.

Wilkinson (2009) suggested scholars to pay more attention to the psychological factors, as it controlled people’s thoughts. The psychological factors did not only encourage people rioting, but also influenced people for other target choices. This target choice could be, for instance hoarding foodstuff. Timmer (2010), Brinkman and Hendrix (2010), Hendrix, C., et al. (2009) and Slayton T.
(2009) all mentioned about psychological effects. Slayton T. (2009) described market psychology as wind and food prices rise as fire, when food prices increase market psychology incited to rage fire. Brinkman and Hendrix (2010), they stated that psychological dynamics were important particularly by the rapid changes in expectations and panic. Psychology played an important role in stock market, as traders acted according to everybody else believes. Psychology also played an important role in price volatility in the regular market.

To summarize the above literature, “RISK” left me a deep impression. Hendrix (2009) mentioned that through risks international food crisis shock in 2007-2008 was quickly transferred from international market to domestic market. Furthermore, the risks were transferred from domestic market to local people, and inducing economic grievances and conflicts.

5.3 Food prices, Economic grievances and Conflicts

As Hendrix, et al. (2009) referred to economic grievances that related to economic growth, inflation, and the changes in the international market price of major trade products, and the level of income and the income change. Low-income Sub-Saharan countries (excluding oil countries) are mostly low-speed GDP growth countries with high inflations. The international food prices surge during 2007-08 had enormous impact on low-income people in the countries, as the economic grievances induced people’s angry, furthermore induced conflicts onset.

5.3.1 Economic growth

Most low-income Sub-Saharan African countries (excluding oil countries) had experienced a long-term slow economic growth or non-economic growth. International food prices shock created high risks to the Sub-Saharan African countries. Food prices shock impacted on low-income countries more than on high-income countries. Economic growth could help Sub-Saharan African countries to improve their productivities and increase people’s income, especially it could help countries to get out of poverty. However, slow economic growth or non-economic growth would keep labours continuing work in their fields in order to produce food products for their increased population. The decline in poverty has been slow during 1980 to 1999 in Sub-Saharan African countries since their slow economic growth.

The annual average growth rate of real gross domestic product (GDP) for Sub-Saharan African countries was 1.8 percent during 1980-89, 2.4 percent during 1990-99 and 5.1 percent during 2000-09. In 2000-09, economic growth started to speed up, that was a good sign for Sub-Saharan African
countries. At the beginning of economic growth, part of people may receive more income. Unfortunately, most people still remain their absolute poverty. The polarization between the rich and the poor gets more intensification.

Figure 15: Gross domestic product (GDP), real (2000 $ millions)

Source: Data collected from Africa Development Indicators 2011, the World Bank

From World Bank 2011 Africa development indicators, I collected the data of above eight low-income Sub-Saharan African countries that experienced food riots during 2007-08, including real gross domestic product, gross national income per capita and consumer price index during 1980 to 2009, the changes of international food prices of maize, rice and wheat during 2005 to 2009 and producer’s maize price during 1991 to 2008. The real GDP growth trend as shown in Figure 15, most of the eight riots’ countries had economic slow growth during 1980 to 2009, such as Cote d’Ivoire real GDP growth rate was 0.8 percent during 2000-09.

Except, Ethiopia and Mozambique. Ethiopia had dramatically GDP growth during 2000-09, which GDP growth rate was 8.5 percent. However, during the previous 20 years, Ethiopia real GDP growth relatively slow, which GDP growth rate were 2.1 percent during 1980-89 and 3.7 percent during 1990-99. Mozambique GDP growth rate was even negative during 1980-89 by -0.9 percent, yet 6.0 percent during 1990-99 and 7.9 percent during 2000-09.

5.3.2 The level of income and the income changes

The annual average growth rate of gross national income per capita (GNI) was 12.2 percent during 2000-09, compare to 1990-99 it was only -1.1 percent and during 1980-89 it was negative growth by -2.0 percent. Figure 16 shows that GNI in the eight riots’ countries I mentioned before had dramatically grown during 2003-09. Many countries GNI had grown around double, such as Senegal and Cote d’Ivoire. The change of income as shown in Table 1, during 2000-09, most of countries GNI growth rate were between 6 to 12 percent, except Guinea -1.2 percent and Guinea-Bissau 17.2 percent.

Figure 16: Gross national income per capita, World Bank Atlas method (2011 US dollar)

Source: Data collected from Africa Development Indicators 2011, the World Bank

Table 1: The annual average growth (%) of gross national income per capita (GNI) during 2000-09 and consumer price index (CPI) in 2008 (%)

<table>
<thead>
<tr>
<th></th>
<th>GNI growth in 2000-09</th>
<th>CPI in 2008</th>
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<tbody>
<tr>
<td>Senegal</td>
<td>9.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Mozambique</td>
<td>7.9</td>
<td>10.3</td>
</tr>
<tr>
<td>Mauritania</td>
<td>10.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Guinea-Bissau</td>
<td>17.2</td>
<td>10.5</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>11.7</td>
<td>44.4</td>
</tr>
<tr>
<td>Cote d’Ivoire</td>
<td>7.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>9.8</td>
<td>10.7</td>
</tr>
<tr>
<td>Madagascar</td>
<td>6.0</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Source: Data collected from Africa Development Indicators 2011, the World Bank
The dramatic GNI growth mostly was due to inflation rate increasing. Income and consumer price spiral as Table 1 shows, “income chase price and price chase income”, as wage earners tried to maintain purchasing power equal to the rising costs, local people had to try to push their nominal after-tax wages upward in order to catch up with rising price. Burkina Faso GNI growth rate was 9.8 percent during 2000-09 and its inflation rate was 10.7 percent in 2008. Guinea-Bissau GNI growth rate was 17.2 percent during 2000-09 and its inflation rate was 10.5 percent in 2008. Ethiopia GNI growth rate was 11.7 percent during 2000-09 and its inflation rate was 44.4 percent in 2008. The income increasing caused the distribution of income inequality, which indicated more gaps between households, furthermore to cause grievances.

5.3.3 Inflation

Consumer price index (CPI) can be also named as retail price index (RPI), which is “used to measure changes in the cost of living, the money that must be spent to purchase the typical bundle of goods consumed by a representative household.” (Begg, 1987)

Figure 17: Pass-through from International to Domestic Food prices Inflation

Source: IMF – International Monetary Fund (2011)

International food prices rose implies higher inflation rate. The author of IMF (2011) suggested that International food prices inflation pass-through to domestic food prices inflation was larger in emerging and developing countries than in advanced countries. As shown in Figure 17, a 1 percent food prices shock to domestic food prices was 0.34 percent in emerging and developing countries and 0.18 percent in advanced countries in the median of their samples. This might be a useful
approach to explain international food prices shock affected low-income countries more than high-income countries.

As Figure 18 presents, the inflation rates in most above seven riots countries were high during 2007-08. The inflation rate in net staple importer Ethiopia had reached to 44.4 percent in 2008 and the inflation rate in Madagascar reached to 18.5 percent in 2005, and Mozambique reached to 13.2 percent in 2006. The inflation rates of Senegal and Cote d’Ivoire are quite stable during 2000-09, the inflation rate of Senegal rose to 5.9 percent in 2007 and Cote d’Ivoire rose to 6.3 percent in 2008. However, many Sub-Saharan African countries’ inflation rate had changed irregularly, such as Senegal and Cote d’Ivoire, the growth rate of inflation during 2000-09 had been decreased compare to 1980-89 and 1990-99. Ethiopia, the inflation growth rate had increased all the way since 1980 to 2009.

Figure 18: Consumer price index during 1980-2009 (annual growth %)

Source: Data collected from Africa Development Indicators 2011, the World Bank

Inflation associated with incomes and the shifts in relative price had significant effects on poor households. Relative price referred to households whose share of food expenditure occupied their total expenditure. Poor households had more shares on their food expenditure, rich households had less shares on their food expenditure. In low-income African countries the share of household food expenditure could exceed 70 percent of their total expenditure. (Hendrix, et al., 2009) For low-income households in Sub-Saharan Africa, when the inflation rate getting higher, their relative food prices still kept high, yet their income kept low. Low-income households in Sub-Saharan Africa could not afford to purchase high price food. Hungers had to fight for food before their dying.
5.3.4 The changes in the international market price of major trade grains

Figure 19: The international market prices of maize, rice and wheat (Index = average of monthly prices of year 2005 = 100)

Source: World Bank, GEM; International Monetary Fund, primary commodity prices

As Figure 19 shown, first, international maize real price increased from August 2006 to February 2007 by 48 percent, then dropped by 29 percent to July 2007 and kept same level until October 2008. Maize price again rose by 59 percent until its peak in January 2009. Then wheat real price increased from May 2007 to February 2008 by 65 percent. Followed by real price of rice increased from November 2007 to April 2008 by 137 percent. Then sharply dropped to July 2008 by 32 percent. Rice price again went up until February 2009 by 77 percent. Low-income sub-Saharan

Figure 20: Producer maize price (2011 $ per metric ton)

Source: Data collected from Africa Development Indicators 2011, the World Bank
African countries had to take the international food prices as they were, that cause people in Sub-Saharan Africa unrest.

Producer price index is also named as wholesale price index, which used to measure average changes in price received by domestic producers for their output (Burda and Wyplosz, 1993). The three net exporting riot countries Cote d’Ivoire, Burkina Faso and Madagascar, the price of producer maize and producer has risen dramatically during 2005-08, as shown in Figure 20. For Cote d’Ivoire and Burkina Faso, producer maize price both rose by 178 percent during 2000-08. Producer must gain quite much from exporting. Unfortunately, government controlled the high exporting price by banning export restrictions and raising the export taxes. As Chapter 4 shown, the riots of Cote d’Ivoire and Burkina Faso during 2007-08 were related to local people against taxes.

5.4 Relative deprivation

Sub-Saharan African countries (excluding oil countries) suffered from absolute deprivation for a long period. As Chart 1 shown, the international food prices surge in 2007-08 affected Sub-Saharan African countries (excluding oil countries) through their economic infrastructure, which had already induced plenty economic grievances. Furthermore, the effects went through relative deprivation with psychological effects and lit the conflicts onset.

Chart 1: Food prices and Conflicts

“Relative deprivation” is a term, which related to a perceived entitlement or expectation (Gurr, 1970), and stemmed from the temporal comparisons among certain group (Hendrix, C., et al., 2009). Hendrix, C., et al. (2009) stated that “relative deprivation” hypothesis combined economic
and psychological factors. The hypothesis focused on the motives of people on their basic needs. The development process of riots was from anger, frustration to resentment inducing protest and violence. Unfulfilled material expectations could cause this process happen. “Relative deprivation” could be raised by the distribution of income, the temporal changes in income and other measures of well-being.

Counterfactual thinking is a psychological term, which means people have to imagine alternative to reality. Olson and Roese have enumerated principles on counterfactual thinking and apply each principle to relative deprivation (Walker, I. and Smith, H., 2002). Counterfactual thinking might induce people negative thinking of their relative deprivation. For Senegal, Mozambique, Mauritania, Guinea-Bissau, Ethiopia, Cote d’Ivoire, Burkina Faso and Madagascar, gross national income per capita (GNI) in 2000-09 and consumer price index (CPI) in 2008 were both increased, which had intensified the polarization between the poor and the rich. The temporal changes in income or other measures of well-being could force local people to compare with other inter-group people using their counterfactual thinking. Anger local people were eager to join a group in order to reach certain power for punishing unfair behaviour, for example, lack of money to buy food and government raised taxes, which finally induced conflicts onset.
“International price movements reflect the global demand-supply balance and have very remarkable effects at the country level as the food crisis of 2007-08 has shown.” (Hendrix, et al., 2009). In this paper, I have done the analyses of the international food market demand-supply adjustment during 2007-08 international food prices surge and examined the market equilibrium movement. I have presented the characteristics of Sub-Saharan African countries (excluding oil countries) that were low-income, small net import dependent and vulnerable countries. Due to these attributes, Sub-Saharan African countries (excluding oil countries) had to take the international food prices as given and it were affected significantly by the food prices surge during 2007-08.

None of the factors caused International food prices surge during 2007-08 can be ignored, as there are psychological effects. Psychological effects could take all the possibility from the effects both on supply side and demand side going through people’s thoughts and reacting unimaginably, for instance food hoarding. Small amount food hoarding is insignificant, yet if 7 billion people all hoarding food that would be something hard to imagine. There is another Chinese archaism, “Be prepared for danger in times of peace!” Developed countries currently do not need to worry about lack of food. However, food prices shocks can have instant impacts on the international food market. Suppose that big food export countries ban their export restriction in one night, for instance, due to water pollution. On the next day everybody starts to hoard food. How can importing countries manage without enough food?

For developing countries, food prices surge could kill millions of people. When people are hungry, they do not care about any rules, they will fight for food instead of waiting for death. Conflicts have taken place in many low-income Sub-Saharan African countries (excluding oil countries) during 2007-08. In this thesis I concentrate on mild conflicts, such as food riots. The processes of food prices surge to conflicts onset went through the economic grievances, relative deprivation and the psychological effects. The economic grievances were presented as the linkage between food prices and conflicts that might be the best approach to explain the conflicts onset with food prices shock.

In order to solve out the problem, finding reasons that caused the problem becomes more important. There are many reasons causing conflicts. International food prices surge during 2007-08 could be
one of the reasons. I listed the most important risks on the relationship between food prices and conflicts in Appendix C from the literature review in Chapter 5. I would like to suggest paying more attention on all of those risks that might cause conflicts, especially on those important factors, as there are psychological effects, small risks could be upgraded to conflicts.

According to Figure 13 in Chapter 4, the trends of intrastate conflict, armed conflict, non-state conflict and one-sided violence were consistence with food prices index in 2007-08. Further investigation on the relationship between food prices and these conflicts would be needed.
### APPENDICES

**Appendix A:** The population of the importing counties and the exporting countries in low-income Sub-Saharan African countries (excluding oil countries) in 2009

<table>
<thead>
<tr>
<th>Exporting countries</th>
<th>Population (millions) 2009</th>
<th>Rural share of total population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cote d'Ivoire</td>
<td>21.1</td>
<td>50.6</td>
</tr>
<tr>
<td>2 Kenya</td>
<td>39.8</td>
<td>78.1</td>
</tr>
<tr>
<td>3 Somalia</td>
<td>9.1</td>
<td>63.0</td>
</tr>
<tr>
<td>4 Madagascar</td>
<td>19.6</td>
<td>70.1</td>
</tr>
<tr>
<td>5 Zambia</td>
<td>12.9</td>
<td>64.4</td>
</tr>
<tr>
<td>6 Burkina Faso</td>
<td>15.8</td>
<td>80.0</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td>118.3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Importing countries</th>
<th>Population (millions) 2009</th>
<th>Rural share of total population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Senegal</td>
<td>12.5</td>
<td>57.4</td>
</tr>
<tr>
<td>2 Benin</td>
<td>8.9</td>
<td>58.4</td>
</tr>
<tr>
<td>3 Mozambique</td>
<td>22.9</td>
<td>62.4</td>
</tr>
<tr>
<td>4 Ghana</td>
<td>23.8</td>
<td>49.2</td>
</tr>
<tr>
<td>5 D.R. Congo</td>
<td>66.0</td>
<td>65.4</td>
</tr>
<tr>
<td>6 Togo</td>
<td>6.6</td>
<td>57.3</td>
</tr>
<tr>
<td>7 Zimbabwe</td>
<td>12.5</td>
<td>62.2</td>
</tr>
<tr>
<td>8 Mauritania</td>
<td>3.3</td>
<td>58.8</td>
</tr>
<tr>
<td>9 Ethiopia</td>
<td>82.8</td>
<td>82.7</td>
</tr>
<tr>
<td>10 Guinea</td>
<td>10.1</td>
<td>65.1</td>
</tr>
<tr>
<td>11 Tanzania</td>
<td>43.7</td>
<td>74.0</td>
</tr>
<tr>
<td>12 Eritrea</td>
<td>5.1</td>
<td>78.8</td>
</tr>
<tr>
<td>13 The Gambia</td>
<td>1.7</td>
<td>42.7</td>
</tr>
<tr>
<td>14 Mali</td>
<td>13.0</td>
<td>67.3</td>
</tr>
<tr>
<td>15 Sierra Leone</td>
<td>5.7</td>
<td>61.9</td>
</tr>
<tr>
<td>16 Uganda</td>
<td>32.7</td>
<td>86.9</td>
</tr>
<tr>
<td>17 Malawi</td>
<td>15.3</td>
<td>80.7</td>
</tr>
<tr>
<td>18 Comoros</td>
<td>0.7</td>
<td>71.9</td>
</tr>
<tr>
<td>19 Guinea-Bissau</td>
<td>1.6</td>
<td>70.1</td>
</tr>
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<td>20 Burundi</td>
<td>8.3</td>
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<td>21 Rwanda</td>
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<td>23 Niger</td>
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<td>26 Central Africa Republic</td>
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<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>538.7</td>
<td></td>
</tr>
</tbody>
</table>
Source: Data collected from Africa Development Indicators 2011, the World Bank; Countries information from Ng, F. and Aksoy, M. (2008)
Appendix B: Definitions of Conflicts
Due to many people confusing the layers of different conflicts, I made the above chart in order to present the different levels of conflicts and their relationships. This chart was made according to the definitions that given by Department of Peace and Conflict Research, UCDP – Uppsala Conflict Data Program.

From behavioral struggle to use sticks beating, to use gun shooting, “Conflict” may refer to “Social conflict”, “Armed force, use of” and “Active conflict”. In my paper, I will focus on “Armed force, use of” and “Active conflict”.

**Social conflict**

“Social conflict” is the struggles between oppressors and oppressed, as Karl Marx & Friedrich Engels defined “Social conflict” in 1848, “The history of all hitherto existing society is the history of class struggles. Freeman and slave, patrician and plebeian, lord and serf, guild-master and journeyman, in a word, oppressor and oppressed, stood in constant opposition to one another, carried on an uninterrupted, now hidden, now open fight, a fight that each time ended, either in a revolutionary reconstitution of society at large, or in the common ruin of the contending classes.” (The Communist Manifesto, 1848)

**Armed force, use of**

The definition of “Armed force, use of”, as UCDP defines, “Use of arms in order to promote the parties’ general position in a state-based conflict.” “Use of armed force” is a state-based definition, which is mainly use for rebel group’s or a government’s first use of armed force in a state-based conflict. The conflict is unnecessary to cause death. The rebel groups are, for example, “Riots” group or “Anti-government demonstration” group. “Riots” is defined as “Developed by states to allow them to prosecute even very small groups of individuals who appeared to pose a threat to public order and state control, often differ substantially from our ordinary-language understanding of these terms.” (Wilkinson 2009). “An anti-government demonstration” is defined as “any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.” (Ulfelder and Lustik, 2007)

**Active conflict**

The definition of “Active conflict”, as UCDP defines, “Active conflict” includes three parts – “State conflict”, “Non-state conflict” and “One-sided violence”. “State conflict” is also named as “Armed
conflict”. Both state-based and non-state conflicts are deemed to be active “if there are at least 25 battle-related deaths per calendar year in one of the conflict’s dyads.” “One-sided violence has to have at least 25 deaths in a year, but it is not battle-related deaths.”

The difference between “Armed conflict” and “Armed force, use of”: First, the Parties. “Armed conflict” and “Armed force, use of” are both state-based conflicts, one of the parties is government of a state; for another party, “Armed conflict” refers to government, “Armed force, use of” refers to civilians.

Second, Battle-Related Deaths. The definition of “Battle-related deaths”, as UCDP defines, “Counted as battle-related deaths is armed conflict behavior between warring parties in a conflict dyad, be it state-based or non-state”. “Armed force, use of” is not between warring parties, although it is a state-based conflict and it does not have any battle-related deaths.

Third, “Armed force, use of” is mainly used when “a rebel group’s or a government’s first use of armed force in a state-based conflict.”

State conflict (Armed conflict), as UCDP defines, “Armed conflict is a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state.” State conflict includes “Civil conflict”, “Extra-systemic Conflict” and “Conflict between two or more countries”. As UCDP defines, all the above conflicts at least one conflict party is the government of a state.

“Civil Conflict” may refer to “Conflict, intrastate” and “Conflict, interstate”. “Conflict, intrastate” and “Conflict, interstate” are both state-based conflicts. “Conflict, intrastate” defined as, “A conflict between a government and a non-governmental party, with no interference from other countries”, for example, conflicts onset between secessions or autonomies. “Conflict, interstate” defined as, “A conflict between two or more governments that is in the same country”, for example, the change of China from Qing dynasty to Republic of China. Under Japanese controlled Qing government and the government of Republic of China are two governments in one state. The conflict between these two governments is interstate conflict.

According to the intensity level of conflicts, the “Minor conflict” may refer to “at least 25 but less than 1000 battle-related deaths in one calendar year”. “War” refers to “at least 1000 battle-related deaths in one calendar year”. Both “Conflict, intrastate” and “Conflict, interstate” include minor conflict and war (UCDP). The definition of “Civil war”: “A violent conflict within a country fought by organized groups that aim to take power at the center or in a region, or to change government
policies (Fearon, 2007). Based on Fearon’s counting, there have been around 125 civil wars since the end of World War II until 2007.

According PRIO/Uppsala data, in Sub-Saharan Africa during 1981 to 1999, there was civil conflict in 27 percent of all country-year observations with more than 25 deaths. And there was civil war in 17 percent of all country-year observations with more than 1000 deaths. (Miguel, E. et al. 2004)

“Extra-systemic Conflict”, as UCDP defines, “An extra-systemic conflict is a conflict between a state and a non-state group outside its own territory. These conflicts are by definition territorial, since the government side is fighting to retain control of a territory outside the state system”, for example, colonial conflicts.

“Conflict between two or more countries” referred to armed conflict onset between two or more states, which at least 25 battle-deaths in one calendar year.

“Non-state conflict”, as UCDP defines, “The use of armed force between two organized armed groups, neither of which is the government of a state.” If the parties of “Civil war” are “organized groups” against “a government of a country”, “Civil war” has to be put under “State conflict”. On another hand, if “organized groups” against to “a region”, “Civil war” has to be put under “Non-state conflict”.

The definition of “One-sided violence”, as UCDP defines, “The use of armed force by the government of a state or by a formally organized group against civilians.” “One-sided violence” is one special type of conflict, as there are at least 25 deaths in a year, which means “Active conflict”. The two parties of “One-sided violence”, one is “the government of a state” which means a state-based conflict, another is “a formally organized group” which is a non-state based conflict. Unfortunately, we could not put “One-sided violence” under either “State conflict” or “Non-state conflict”, the reason is that the 25 deaths of “One-sided violence” is not battle-related deaths, and one of the conflict parties has to be civilians. According to these reasons, we have to raise “One-sided violence” and put it on the same level as “State conflict” and “Non-state conflict”.

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Appendix C: The risks causing conflicts from above mentioned literature

<table>
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<tr>
<th>Risks causing conflicts</th>
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<td>Arezki and Bruckner (2011),</td>
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<td></td>
<td>Besley and Persson (2008)</td>
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<tr>
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<td>Arezki and Bruckner (2011),</td>
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<tr>
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<td>Bruckner and Ciccone (2010)</td>
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<tr>
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<td>Urban consumers</td>
<td>Carter and Bates (2011)</td>
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<td>GDP changes in OECD export destinations</td>
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<td>Political institutions are weak</td>
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<td></td>
<td>Hendrix (2009)</td>
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<tr>
<td>Hybrid regimes</td>
<td>Hendrix (2009)</td>
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